UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,646	07/22/2003	Chia-Chen Chen	0941-0794P	4737

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EXAMINER
BROOME, SAID A

ART UNIT	PAPER NUMBER
2628	

NOTIFICATION DATE	DELIVERY MODE
01/14/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
	10/623,646	CHEN ET AL.
Office Action Summary	Examiner	Art Unit	
	Said Broome	2628	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>31 October 2007</u>.

2a) ☐ This action is **FINAL.**   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1,2,4-6 and 8</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1,2,4-6 and 8</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in

37 CFR 1.17(e), was filed in this application after final rejection. Since this application is

eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e)

has been timely paid, the finality of the previous Office action has been withdrawn pursuant to

37 CFR 1.114. Applicant's submission filed on 10/31/07 has been entered.

Response to Amendment

1. This office action is in response to an amendment filed 10/31/2007.

2. Claims 1 and 5 have been amended by the applicant.

3. Claims 2, 4, 6 and 8 are original.

4. Claims 3 and 7 have been canceled.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 2, 4-6 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention. The following claim language recited in claims 1 and 5 is

unclear: "...the reconstructed 3D model is located on the 3D feature-lines despite of the sample

numbers." However, the claim language has been interpreted to recite that the structure of the

reconstructed model is maintained regardless of changes to the resolution of the model.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 4-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Lee et al.(hereinafter "Lee", "*Fast head modeling for animation*") in view of Migdal et

al.(hereinafter "Migdal", US Patent 6,208,347).

Regarding claim 1, Lee teaches a computer-implemented method of reconstructing a

regular 3D model by feature-line segmentation (pg. 1 1st ¶ lines 1-5: "...*a method to reconstruct*

3D facial model for animation…based on extracting features on a face…and modifying a

generic model with detected feature points."), comprising using a computer to perform the steps

of: (a) inputting original 3D model data (pg. 3 sec. 2.1 3rd ¶ lines 1-4), where 3D VRML range

data (Fig. 3(a)) is initially collected from cameras to provide three-dimensional model data; (b)

building 3D feature-lines according to the original 3D model data (progression from Fig. 3(a) to

Fig. 3(b)); (c) converting the 3D feature-lines into 3D threads wherein the 3D threads are

composed of connection joints, connection lines, and loops (pg. 3 sec. 2.2 1st ¶ lines 6-9: "*To get*

correspondence between points from…points on a generic model…a snake is a good

candidate…we add some more functions…as structure snake…", Fig. 3(b)), wherein the

connection joints are intersection points of the 3D feature-lines and the connection lines are the

3D feature-lines between two connection joints (Fig. 3(b)), in which feature lines illustrate

connections at joint positions, wherein the loops provide closed zones constructed by the

connection lines (pg. 3 sec. 2.2 1st ¶ lines 6-9 and Figs. 3(b) & 4(b)), providing a snake forming a

loop outlining an outer shape of the model's feature lines (Fig. 2); (e) producing a regular

triangular grid sample model according to the 3D threads (Fig. 5(a)); and (f) projecting the

regular triangular grid sample model into the original 3D model to produce a reconstructed 3D

model (pg. 6 sec. 2.3.2 1st ¶ lines 1-6 - pg. 7 lines 1-9: "...*to get accurate positions...We collect*

feature points...of corresponding points on original range data. Then we calculate Voronoi

triangles of chosen feature points...The Voronoi triangles and collected points on a surface are

shown in Figure 5 (a)...Then...projection of points are used...to get the corresponding accurate

coordinate in a range data...Figure 5 (c) is the final result..."), where the captured feature

points forming the triangular grid (Fig. 5(a)) are projected onto the original range data (pg. 3 sec.

2.1 3rd ¶ lines 1-4) in order to generate the reconstructed model (Fig. 5(c)). However, Lee fails to

teach determining and redetermining sample numbers of each connection line, adding or deleting

the loops, outputting the 3D threads, and having the reconstructed 3D model located on the 3D

feature-lines despite of the sample numbers. Migdal teaches (d) determining sample numbers of

each connection line, adding or deleting the loops, and outputting the 3D threads (col. 22 lines

38-47: "...*as 6D data points are added to or removed from the mesh, the faces of the mesh*

change. When those faces are changed, values calculated for any 6D data points associated with

the face can change...When such alterations occur, the computer system 3 must calculate new

values for the affected 6D data points or rearrange their associations with particular mesh

faces." and in col. 27 lines 22-26: "...*incrementally adding...detail from the mesh until the mesh*

meets the resolution set by the user's specification, or until the mesh is created to the highest

density..."), where the number of points, or density, that comprises the interconnecting lines and

loops of the mesh is determined as vertices are added and deleted; and (g) redetermining sample

numbers for each connection line, readding or redeleting the loops, and repeating steps (e) and

(f) if the reconstructed 3D model does not satisfy resolution requirements, and outputting the

reconstructed 3D model if the reconstructed 3D model satisfies the resolution requirements (col.

27 lines 22-40: "...*incrementally adding...points of detail from the mesh until the mesh meets the*

resolution set by the user's specification..."), where the density of the mesh, or triangular mesh

(col. 9 line 29), is continually calculated or redetermined until the desired resolution is reached.

Migdal also teaches that the reconstructed 3D model is located on the 3D feature-lines despite of

the sample numbers (col. 9 lines 23-29: "...*the present system and method maintains an optimal*

structure at all times during "up resolution" or "down resolution" mesh construction...Optimal

construction refers to the "connectivity" of the mesh or the interconnection of the edges that join

the data points and define the geometric primitives of the mesh..."), where the structure of the

reconstructed model is maintained regardless of the changes in resolution of the model.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention

to combine the teachings of Lee with Migdal because this combination would provide accurate

reconstruction of a 3D model through acquiring feature points, instead a large amount of mesh

data, and producing a reconstructed 3D model from a regular grid formed based on the feature

points, whereby the structure of the 3D model is efficiently maintained despite changes to the

mesh surface.

Regarding claims 2 and 6, Lee teaches that the 3D feature-lines are based on the exterior appearance and structure of the original 3D model (pg. 2 2nd ¶ lines 1-4: "*...a fast method applied to two kinds of input to get an animatable cloning of a person...feature detection is described to get rough shape of a given face from orthogonal picture data or range data...*", and in Fig. 1: transition from range data to the feature extraction section) where the features of the outer structure of the 3D model is captured.

Regarding claims 4 and 8, Lee illustrates combined closed regular triangular grids of the loops as the regular triangular grid sample model (Fig. 5(a)). However, Lee fails to teach the remaining limitations. Migdal teaches constructing regular triangular grids in each loop according to the sample numbers of each connection line (col. 27 lines 22-26: "*...incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density...*" and in col. 9 lines 23-29: "*...the present system and method maintains an optimal structure at all times...Optimal construction refers to the "connectivity" of the mesh or the interconnection of the edges that join the data points and define the geometric primitives of the mesh (e.g., the triangular mesh...*"), where points are inserted into the triangular grid, and the mesh is therefore continually formed based on the density or sample numbers of the mesh (progression from Figs. 2c to 2d). The motivation to combine the teachings of Lee and Migdal is equivalent to the motivation of claim 1.

Regarding claim 5, Lee teaches a computer-implemented method of reconstructing a regular 3D model by feature-line segmentation (pg. 1 1st ¶ lines 1-5: "*...a method to reconstruct 3D facial model for animation...based on extracting features on a face in a semiautomatic way*

and modifying a generic model with detected feature points.") comprising using a computer to

perform the steps of: inputting original 3D model data (pg. 2 sec. 2 1st ¶ lines 1-2: "*...to give an*

animation structure to a given range data.", Fig. 1); building 3D feature-lines according to the

original 3D model data (Fig. 3(b)); converting the 3D feature-lines into 3D threads wherein the

3D threads are composed of connection joints, connection lines, and loops (pg. 3 sec. 2.2 1st ¶

lines 6-9: "*To get correspondence between points from...points on a generic model...a snake is a*

good candidate...we add some more functions called...structure snake...", Fig. 3(b)), wherein

the connection joints are intersection points of the 3D feature-lines and the connection lines are

the 3D feature-lines between two connection joints (Fig. 3(b)), in which the feature lines

illustrate connections at the joint positions, wherein the loops provide closed zones constructed

by the connection lines (pg. 3 sec. 2.2 1st ¶ lines 6-9 and Figs. 3(b) & 4(b)), providing a snake

forming a loop outlining an outer shape of the model's feature lines (Fig. 2); producing a regular

triangular grid sample model according to the 3D threads (Fig. 5(a)); and projecting the regular

triangular grid sample model into the original 3D model to produce a reconstructed 3D model

(pg. 1 1st ¶ lines 1-8: "*...extracting features on a face...and modifying a generic model with*

detected feature points...The reconstructed 3D-face can be animated immediately..." and on pg.

6 sec. 2.3.2 1st ¶ lines 1-6 - pg. 7 lines 6-9: "*...feature points are chosen for a fine*

modification...we calculate Voronoi triangles of chosen feature points...we apply...triangles...

for fine modification...Figure 5(c) is the...result after fine modification."), where the captured

feature points forming the triangular grid (Fig. 5(a)) are projected onto the original model (Fig.

4(a)) in order to generate the reconstructed model (Fig. 5(c)). However, Lee fails to teach

determining sample numbers of each connection line, adding or deleting the loops, outputting the

3D threads, and having the reconstructed 3D model located on the 3D feature-lines despite of the

sample numbers.. Migdal teaches determining sample numbers of each connection line, adding

or deleting the loops, and outputting the 3D threads (col. 22 lines 38-47: "...*as 6D data points*

are added to or removed from the mesh, the faces of the mesh change. When those faces are

changed, values calculated for any 6D data points associated with the face can change...When

such alterations occur, the computer system 3 must calculate new values for the affected 6D data

points or rearrange their associations with particular mesh faces." and in col. 27 lines 22-26:

"...*incrementally adding 6D points of detail from the mesh until the mesh meets the resolution*

set by the user's specification, or until the mesh is created to the highest density..."), where the

number of points, as well the density that is directly affected by the sample numbers of those

points, are determined for the displayed mesh. Migdal also teaches that the reconstructed 3D

model is located on the 3D feature-lines despite of the sample numbers (col. 9 lines 23-29:

"...*the present system and method maintains an optimal structure at all times during "up*

resolution" or "down resolution" mesh construction...Optimal construction refers to the

"connectivity" of the mesh or the interconnection of the edges that join the data points and define

the geometric primitives of the mesh..."), where the structure of the reconstructed model is

maintained regardless of the changes in resolution of the model. Therefore it would have been

obvious to one of ordinary skill in the art at the time of invention to combine the teachings of

Lee with Migdal because this combination would provide accurate reconstruction of a 3D model

through acquiring feature points, instead a large amount of mesh data, and producing a

reconstructed 3D model from a regular grid formed based on the feature points, whereby the

structure of the 3D model is efficiently maintained despite changes to the mesh surface.

Response to Arguments

Applicant's arguments filed 10/31/07 have been fully considered but they are not persuasive.

The applicant argues that Lee and Migdal fail to teach or suggest the reconstruction of a regular 3D model from an original 3D model. However, Lee teaches reconstruction of a regular 3D model (Fig. 4(c)) from an original 3D model (pg. 3 sec. 2.1 3rd ¶ lines 2-5: "...*camera is used to generate range data of faces...in VRML format...as shown in Figure 3.*" and on (pg. 6 sec. 2.3.2 1st ¶ lines 1-6 - pg. 7 lines 1-9: "...*to get accurate positions...We collect feature points...of corresponding points on original range data. Then we calculate Voronoi triangles of chosen feature points...Then...projection of points are used...to get the corresponding accurate coordinate in a range data...*"), where feature points of a model are utilized to produce reconstructed 3D model data.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., in the applicant's remarks on pg. 10 3rd ¶ lines 5-6: "...*a locked-position reconstructed 3D model...*") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

The applicant argues that Lee and Migdal fail to teach or suggest the technical feature of the invention that provides a method of adjusting resolution of the reconstructed 3D model without changing the original feature lines. However, Migdal teaches maintaining the structure

of lines and vertices of a mesh surface despite changes in resolution (col. 27 lines 22-26:

"...*incrementally adding...detail...until the mesh meets the resolution set by the user's*

specification..." and in col. 9 lines 23-29: "...*the present system and method maintains an*

optimal structure at all times during "up resolution" or "down resolution" mesh

construction...Optimal construction refers to the "connectivity" of the mesh...that join the data

points and define the geometric primitives of the mesh..."), therefore it would have been obvious

to one of ordinary skill in the art at the time of invention to combine the teachings of Migdal

with Lee, because this combination would ensure that the integrity of the original feature lines

(Lee: Figs. 3(b) & 4(b)) would be maintained after a reconstructed 3D model is generated (Fig.

4(c)), thereby reducing visual artifacts or distortions of the mesh surface (sec. 4 1st ¶ lines 1-12:

"*We described a...efficient method to create a virtual animatable face...Our...method brings*

reliable results... It has shown its efficiency and...has the better visual result for output...")

during 3D animation of the mesh (abstract lines 1-8: "...*an efficient method to make individual*

faces for animation...The reconstructed 3D face can be animated...").

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Said Broome whose telephone number is (571)272-2931. The

examiner can normally be reached on M-F 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

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like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Said Broome/
Art Unit 2628
1/3/08

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